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AUTHOR(S):

Stoer, J.

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Analysis of interior-point-paths for sufficient linear complementarity problems

J. Stoer

Institut für Angewandte Mathematik und Statistik
Universität Würzburg, Würzburg, Germany

Abstract: In this lecture we describe the behavior of infeasible-interior-point-paths for solving horizontal linear complementarity problems

$$(LCP) \qquad Px + Qy = q, \quad (x, y) \geq 0, \quad x^T y = 0,$$

that are sufficient in the sense of Cottle, Pang and Venkateswaran (1989). These paths are defined as the solution $(x, y)(r, \eta)$, $r > 0$, $\eta > 0$, of

$$\begin{aligned} Px + Qy &= q + r\bar{q}, \quad (x, y) \geq 0, \\ x_i y_i &= r\eta_i, \quad i = 1, \ldots, n, \end{aligned}$$

and they converge to a central point of the set of solutions of (LCP) as $r \downarrow 0$. It is shown that these paths are analytic functions of r even at $r = 0$, if (LCP) has a strictly complementary solution, and are analytic in $\rho := \sqrt{r}$ at $\rho = 0$, if (LCP) is solvable but has no strictly complementary solutions.